

REMARKS

A Petition for Extension of Time is being concurrently filed with this Amendment. Thus, this Amendment is being timely filed.

Applicants respectfully request the Examiner to reconsider the present application in view of the foregoing amendments to the claims and the following remarks.

Status of the Claims

In the present Amendment, claims 5, 6, 7 and 18 have been amended, and claim 19 has been added. Thus, claims 1-19 are pending in the present application.

No new matter has been added by way of these amendments. The amendments to claims 5 and 7 have support in the present specification at page 11, line 20. Further, subject matter is actually being deleted from claim 16. Also, a misspelling in claim 18 is being corrected, and thus Applicants are in no way conceding any limitations with respect to the interpretation of the claims under the Doctrine of Equivalents.

Also, claim 19 reflects the subject matter deleted in claim 16. Thus, no new matter has been added with this new claim.

Based upon the above considerations, entry of the present amendment is respectfully requested.

In view of the following remarks, Applicants respectfully request that the Examiner withdraw all rejections and allow the currently pending claims.

Issues under 35 U.S.C. § 112, Second Paragraph

Claims 5, 7 and 16-18 stand rejected under 35 U.S.C. § 112, second paragraph, for asserted lack of definiteness (see page 2 of the Office Action). Applicants respectfully traverse, and reconsideration and withdrawal of this rejection are respectfully requested.

Regarding claims 5 and 7 and the term “pseudohalogen,” Applicants respectfully refer the Examiner to the disputed claims as shown herein. It is believed that the rejection of these claims has been obviated.

Regarding claims 16-18 and the term “non-solvent,” Applicants respectfully traverse since the breadth of a claim is not to be equated with indefiniteness. *In re Miller*, 441 F.2d 689, 169 USPQ 597 (CCPA 1971); *see also* M.P.E.P. § 2173.04. Here, Applicants respectfully submit that “non-solvent” is an art-recognized term, the meaning of which is clear to one of ordinary skill in the art. Indeed, the function of the recited “non-solvent” is explained in the disputed claim 16 (*i.e.*, “to precipitate the cellulose ester”). By adding the non-solvent for the cellulose ether into the solution containing the cellulose ether, the cellulose ether will precipitate. This is explained by the fact that the cellulose ether is not soluble in the non-solvent. Applicants also note page 15, lines 11-18 of the present specification. Besides undue breadth of claims not equating to indefiniteness, the disputed claim language must be read in light of the specification as it would be interpreted by one of ordinary skill in the art. *In re Johnson and Farnham*, 194 USPQ 187, 194 (CCPA 1977).

Therefore, the term “non-solvent” complies with the requirements of the statute. It is not “impossible to determine the metes and bounds” as asserted. The function of the non-solvent is sufficiently explained, and those skilled in the art will be able to determine from Applicants’

specification the meaning of “non-solvent” as necessary to practice the invention. Thus, Applicants submit that the subject matter embraced by claims is definite and that the claims set out and circumscribe a particular area with a reasonable degree of precision and particularity.

Reconsideration and withdrawal of this rejection are respectfully requested.

Issues under 35 U.S.C. § 103(a)

Claims 1-18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over *Nobuo et al.* (JP 2002-003478; machine translation provided by Examiner) and *Swatloski et al.* (WO 03/029329) in view of *Ullmann's Encyclopedia of Chemical Technology*, Brandt *et al.*, Vol. 2, pp. 221-234 (2001)) (see pages 3-5 of the Office Action).

First, Applicants wish to clarify that the cited *Ullmann's Encyclopedia of Chemical Technology* reference appears to correspond to Vol. A5, pp. 461-468 since the Examiner refers to these specific pages in the Office Action (see, e.g., page 4, lines 7-11). Also, the *Ullmann's Encyclopedia* reference corresponds to reference “CD” and not reference “CB” in the IDS filed December 5, 2006. If this is incorrect, Applicants respectfully request the Examiner to contact Applicants’ representative at the contact information given at the end of this reply.

Second, Applicants respectfully traverse this rejection, and reconsideration is based on the following remarks. Overall, Applicants do not concede that a *prima facie* case of obviousness has been established.

The cited *Nobuo et al.* reference discloses dissolving synthetic macromolecule, protein, a polysaccharide or a sugar derivative in ionic liquids (see paragraph [0001]) with a modifying protein, sugar or a polysaccharide by reaction with a water-unstable acid halide, acid anhydride

or activated ester (paragraph [0031]). Such a reaction results in the formation of an ester. This is different from the present invention.

A proper analysis under § 103(a) requires consideration of the four *Graham* factors of: determining the scope and content of the prior art; ascertaining the differences between the prior art and the claims that are at issue; resolving the level of ordinary skill in the pertinent art; and evaluating any evidence of secondary considerations (e.g., commercial success; unexpected results). 383 U.S. at 17, 148 USPQ at 467. Here, Applicants respectfully submit that the *Graham* factors, including ascertaining the differences between the prior art and the claims that are at issue, weigh in their favor. As noted above, Nobuo *et al.* as a primary reference is directed to a reaction resulting in the formation of an ester.

Furthermore, Applicants respectfully submit that there is a difference in reaction techniques between the present invention and Nobuo *et al.*, wherein etherification is more difficult to carry out versus esterification. Esterification does not require a catalyst, and in the case that a catalyst is used, both acid and base catalysts can be employed. This is contrary to etherification (as in the present invention) which requires a base catalyst. Further, one of ordinary skill in the art knows that such base catalysts easily depolymerize natural polymers, such as cellulose.

Thus, although polysaccharides are mentioned in the cited reference, Nobuo *et al.* fail to disclose cellulose. Of course, this is acknowledged at page 3 of the Office Action. But Applicants also note that Nobuo *et al.* fail to disclose dissolving and modifying cellulose, let alone etherifying cellulose. In addition, as admitted in the Office Action at page 3, Nobuo *et al.* fail to disclose using microwave irradiation. Thus, the cited primary reference is deficient more

so than what is stated in the outstanding Office Action, and citing Swatloski *et al.* and *Ullmann's Encyclopedia* does not make this rejection any more proper.

The cited secondary reference of Swatloski *et al.* is also cited and discussed by Applicants at page 6, starting line 28 of the present specification. Swatloski *et al.* is a reference that relates to dissolving cellulose in various ionic liquids including under microwave irradiation, and precipitating pure cellulose from the solution form by selected solvents. However, the cited Swatloski *et al.* reference fails to disclose etherifying cellulose as well as separating the cellulose ether from the reaction mixture. Thus, Swatloski *et al.* does not account for the deficiencies of the primary reference, nor does Swatloski *et al.* provide any guidance to the skilled artisan regarding etherification (versus esterification).

Of course, the Examiner also cites *Ullmann's Encyclopedia* as another secondary reference. The *Ullmann's Encyclopedia* reference discloses etherifying cellulose to form cellulose ethers.

It is known that etherification reactions require a base catalyst. One of ordinary skill in the art knows that such base catalysts easily depolymerize natural polymers, such as cellulose. Specifically, the glucoside bonds of cellulose are susceptible to bases resulting in degradation, *i.e.*, in said depolymerization. Additionally, the cellulose chain will break down already by thermal treatment (>170°C). Thus, one of the problems with the instant rejection is that there is no resolution of the problems associated in etherification reactions.

The present invention has solved such drawbacks and problems. As explained on page 8, lines 18-32 of the present specification, Applicants have discovered a new and more efficient process in preparing cellulose ethers. Further, the dissolution of the etherification reagents in

ionic liquids is not obvious to one of ordinary skill in the art, especially upon based upon a reading of the cited Nobuo *et al.*, Swatloski *et al.* and *Ullmann's Encyclopedia* references. Though the Examiner refers to “optimizing conditions” (see Office Action at page 4, lines 11-17), the present invention is not a matter of just optimizing conditions as explained above. The references do not even provide any guidance regarding the problems with etherification reactions requiring a base catalyst, and how one of ordinary skill in the art knows that such base catalysts easily depolymerize natural polymers, such as cellulose.

Further, the primary reference of Nobuo *et al.* involves the formation of esters (e.g., esterification). This is inconsistent with *Ullmann's Encyclopedia* and well as being inconsistent with what is being claimed. In this regard, the instantly claimed invention cannot change the principle of operation of the primary reference or render the reference inoperable for its intended purpose. *See M.P.E.P. §§ 2143.01(V) and 2143.01(VI)* (see sections entitled “The Proposed Modification Cannot Render the Prior Art Unsatisfactory For Its Intended Purpose” and “The Proposed Modification Cannot Change the Principle of Operation of a Reference”) and M.P.E.P. § 2145(III).

Moreover, based upon a reading of the cited references, one of ordinary skill in the art would not realize or even be guided to a higher degree of substitution (DS) that can be obtained with the present invention. Additionally, one of ordinary skill in the art would not be guided to the separation of the cellulose ether from the ionic liquid. It is thus not a matter of “optimization” as asserted in the Office Action. The skilled artisan would not achieve the present invention based on the disclosures of the cited references. Therefore, Applicants respectfully submit that one of ordinary skill in the art would not combine the cited references as done so in the

outstanding Office Action. There are even chemical problems associated with this asserted combination of references as explained above (e.g., esterification disclosed in primary reference; base catalysts used in etherification reactions).

Accordingly, based on the above comments, reconsideration and withdrawal of this rejection are respectfully requested.

Conclusion

A full and complete response has been made to all issues as cited in the Office Action. Applicants have taken substantial steps in efforts to advance prosecution of the present application. Thus, Applicants respectfully request that a timely Notice of Allowance issue for the present case.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Eugene T. Perez (Reg. No. 48,501) at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Dated: _____

Respectfully submitted,

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